The Nature Of Technology What It Is And How Evolves W Brian Arthur

Why it matters that our relationship with nature is increasingly mediated and augmented by technology. Our forebears may have had a close connection with the natural world, but increasingly we experience technological nature. Children come of age watching digital nature programs on television. They inhabit virtual lands in digital games. And they play with robotic animals, purchased at big box stores. Until a few years ago, hunters could "telehunt"—shoot and kill animals in Texas from a computer anywhere in the world via a Web interface. Does it matter that much of our experience with nature is mediated and augmented by technology? In Technological Nature, Peter Kahn argues that it does, and shows how it affects our well-being. Kahn describes his investigations of children's and adults' experiences of cutting-edge technological nature. He and his team installed "technological nature windows" (50-inch plasma screens showing high-definition broadcasts of real-time local nature views) in inside offices on his university campus and assessed the physiological and psychological effects on viewers. He studied children's and adults' relationships with the robotic dog AIBO (including possible benefits for children with autism). And he studied online "telegardening" (a pastoral alternative to "telehunting"). Kahn's studies show that in terms of human well-being technological nature is better than no nature, but not as good as actual nature. We should develop and use technological nature as a bonus on life, not as its substitute, and re-envision what is beautiful and fulfilling and often wild in essence in our relationship with the natural world.

A leading technology expert examines ways to manage the rapid proliferation of technology and come to grips with its pervasive influence. Technology--always a key driver of historical change--is transforming society as never before and at a far more rapid pace. This book takes the reader on a journey into what the author identifies as the central organizing construct for the future of civilization, the continued proliferation of technology. And he challenges us to consider how to think about technology to ensure that we humans, and not the products of our invention, remain in control of our destinies? In this informative and insightful examination, Dr. Daniel M. Gerstein--who brings vast operational, research, and academic experience to the subject--proposes a method for gaining a better understanding of how technology is likely to evolve in the future. He identifies the attributes that a future successful technology should seek to emulate and the pitfalls that a technology developer should try to avoid. The aim is to bring greater clarity to the impact of technology on individuals and society. In particular, he considers three technologies now converging that will shape the future: biotechnology, artificial intelligence, and the "internet of things." He asks: Will we continue to develop new technologies in these fields merely because basic research shows that we can, or should we first consider the likely effects of these technologies on the quality of life at the individual, societal, and global levels? Dr. Gerstein makes a compelling case that rational and informed evolution of our technological options is the best course for ensuring a brighter future.

Mediating Nature considers how technology acts as a mediating device in the construction and circulation of images that inform how we see and know nature. Scholarship in environmental communication has focused almost exclusively on verbal rather than visual rhetoric, and this book engages ecocritical and ecocompositional inquiry to shift focus onto the making of images. Contributors to this dynamic collection focus their efforts on the intersections of digital media and environmental/ecological thinking. Part of the book's larger argument is that analysis of mediations of nature must develop more critical tools of analysis toward the very mediating technologies that produce such media. That is, to truly understand mediations of nature, one needs to understand the creation and production of those mediations, right down to the algorithms, circuit boards, and power sources that drive mediating technologies. Ultimately, Mediating Nature contends that ecological literacy and environmental politics are inseparable from digital literacies and visual rhetorics. The book will be of interest to scholars and students working in the fields of Ecocriticism, Ecocomposition, Media Ecology, Visual Rehtoric, and Digital Literacy Studies.

The Handbook Philosophy of Technology and Engineering Sciences addresses numerous issues in the emerging field of the philosophy of those sciences that are involved in the technological process of designing, developing and making of new technical artifacts and systems. These issues include the nature of design, of technological knowledge, and of technical artifacts, as well as the toolbox of engineers. Most of these have thus far not been analyzed in general philosophy of science, which has traditionally but inadequately regarded technology as mere applied science and focused on physics, biology, mathematics and the social sciences. • First comprehensive philosophical handbook on technology and the engineering sciences • Unparalleled in scope including explorative articles • In depth discussion of technical artifacts and their ontology • Provides extensive analysis of the nature of engineering design • Focuses in detail on the role of models in technology

WTF?

A Philosophical Approach to Computer Mediated Communication

Society, Nature, and Technology

The Illusory Boundary

The Fourth Industrial Revolution

Next Nature

What It Is and How It Evolves

My Motive for Writing This Book was to Understand Economics through Nature Individuals, organizations, and politicians (i.e., their agents) continually damage economies by obtaining unearned benefits. I felt by understanding economics through nature I could show how really damaging it is. I started with the Big Bang. Not surprisingly, I first encountered the laws of thermodynamics: Energy naturally flows to regions of lesser energy. Clearly, replenishing our continual loss of energy requires a healthy economy. True, but my search revealed so much more. Natural Selection In 1859, Charles Darwin published his seminal work, On The Origin of Species. He recognized the relationship between economics and ecology and borrowed some ideas from economics. The esteemed Harvard evolutionary biologist, Edward O. Wilson, believes that the social sciences and the humanities make sense only in light of evolution. I agree enthusiastically. Natural selection, the driving force behind evolution, designs individuals to conform to their environment. Additionally, many evolutionary biologists believe (as Darwin suspected) that in social species, such as humans, group selection also occurs. That is, members of a group (i.e., family and friends) would help a seemingly deficient member of the group survive because, doing so, might increase the probability that the group will survive. The degree of cooperation between two individuals tends to be inversely correlated with the genetic distance between them. Some Primary Revelations Moralities Natural selection designs an individual to conform to its environment. A primary purpose of this book is to show that moral behavior for a society is simply its successful behavior with respect to natural selection. That is, our morality is designed by natural selection to conform to our environment - and there are countless environments. Free Market Economy Realizing this inherent link between morality and survival should change how we view willful human manipulation and deformation of our economies. In fact, the implications of this inherent link are vast. This book shows that the free market economy is the moral economy because it is the economy in which individuals can most likely be successful. We define the free market in terms of accuracy.

This compelling new book challenges the view that a clear and unwavering boundary exists between nature and technology. Rejecting this dichotomy, the contributors show how the history of each can be united in a constantly shifting panorama where definitions of "nature" and "technology" alter and overlap.

In this volume, Robert J. Sternberg and David D. Preiss bring together different perspectives on understanding the impact of various technologies on human abilities, competencies, and expertise. The inclusive range of historical, comparative, sociocultural, cognitive, educational, industrial/organizational, and human factors approaches will stimula

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A History of the Environmental Future

Exploring the Nature of Information, Systems and Technology

Technological Nature

Philosophy of Technology and Engineering Sciences

Rethinking the Nature and Nurture of Research

Innovation under the Radar

The Evolution of Technology

An examination of how Western visions of endless future growth have contributed to the global environmental crisis For centuries, the West has produced stories about the future in which humans use advanced science and technology to transform the earth. Michael Rawson uses a wide range of works that include Francis Bacon's New Atlantis, the science fiction novels of Jules Verne, and even the speculations of think tanks like the RAND Corporation to reveal the environmental paradox at the heart of these narratives: the single-minded expectation of unlimited growth on a finite planet. Rawson shows how these stories, which have long pervaded Western dreams about the future, have helped to enable an unprecedentedly abundant and technology-driven lifestyle for some while bringing the threat of environmental disaster to all. Adapting to ecological realities, he argues, hinges on the ability to create new visions of tomorrow that decouple growth from the idea of progress.

An examination of how technological failures defined nature and national identity in Cold War Canada. Throughout the modern period, nations defined themselves through the relationship between nature and machines. Many cast themselves as a triumph of technology over the forces of climate, geography, and environment. Some, however, crafted a powerful alternative identity: they defined themselves not through the triumph of machines over nature, but through technological failures and the distinctive natural orders that caused them. In The Unreliable Nation, Edward Jones-Imhotep examines one instance in this larger history: the Cold War–era project to extend reliable radio communications to the remote and strategically sensitive Canadian North. He argues that, particularly at moments when countries viewed themselves as marginal or threatened, the identity of the modern nation emerged as a scientifically articulated relationship between distinctive natural phenomena and the problematic behaviors of complex groups of machines. Drawing on previously unpublished archival documents and recently declassified materials, Jones-Imhotep shows how Canadian defense scientists elaborated a distinctive “Northern” natural order of violent ionospheric storms and auroral displays, and linked it to a “machinic order” of severe and widespread radio disruptions throughout the country. Tracking their efforts through scientific images, experimental satellites, clandestine maps, and machine architectures, he argues that these scientists naturalized Canada's technological vulnerabilities as part of a program to reimagine the postwar nation. The real and potential failures of machines came to define Canada, its hostile Northern nature, its cultural anxieties, and its geo-political vulnerabilities during the early Cold War. Jones-Imhotep's study illustrates the surprising role of technological failures in shaping contemporary understandings of both nature and nation.

Blending social analysis and philosophy, Albert Borgmann maintains that technology creates a controlling pattern in our lives. This pattern, discernible even in such an inconspicuous action as switching on a stereo, has global effects: it sharply divides life into labor and leisure, it sustains the industrial democracies, and it fosters the view that the earth itself is a technological device. He argues that technology has served us as well in conquering hunger and disease, but that when we turn to it for richer experiences, it leads instead to a life dominated by effortless and thoughtless consumption. Borgmann does not reject technology but calls for public conversation about the nature of the good life. He counsels us to make room in a technological age for matters of ultimate concern—things and practices that engage us in their own right.

From the author of the New York Times bestseller The Inevitable— a sweeping vision of technology as a living force that can expand our individual potential In this provocative book, one of today's most respected thinkers turns the conversation about technology on its head by viewing technology as a natural system, an extension of biological evolution. By mapping the behavior of life, we paradoxically get a glimpse at where technology is headed-or "what it wants." Kevin Kelly offers a dozen trajectories in the coming decades for this near-living system. And as we align ourselves with technology's agenda, we can capture its colossal potential. This visionary and optimistic book explores how technology gives our lives greater meaning and is a must-read for anyone curious about the future.

How Eight Technologies Made Us Human and Brought Our World to the Brink

The Nature of Value

How Environments Create Moralities and How Technology Modifies Environments

Adopting New Medical Technology

The Nature Fix: Why Nature Makes Us Happier, Healthier, and More Creative

Complexity and the Economy

Friendship and Technology

What information and decisionmaking processes determine how and whether an experimental medical technology becomes accepted and used? Adopting New Medical Technology reviews the strengths and weaknesses of present coverage and adoption practices, highlights opportunities for improving both the decisionmaking processes and the underlying information base, and considers approaches to instituting a much-needed increase in financial support for evaluative research. Essays explore the nature of technological change; the use of technology assessment in decisions by health care providers and federal, for-profit, and not-for-profit payers; the role of the courts in determining benefits coverage; strengthening the connections between evaluative research and coverage decisionmaking; manufacturers' responses to the increased demand for outcomes research; and the implications of health care reform for technology policy.

The Nature of Technology will change the way you think about this fundamental subject forever. W. Brian Arthur's many years of thinking and writing about technology have culminated in a unique understanding of his subject. Here he examines the nature of technology itself: what is it and how does it evolve? Giving rare insights into the evolution of specific technologies and a new framework for thinking about others, every sentence points to some further truth and fascination. At a time when we are ever more reliant on technological solutions for the world's problems, it is extraordinary how little we actually understand the processes that lead to innovation and invention. Until now. This will be a landmark book that will define its subject, and inspire people to think about technology in depth for the very first time.

Research powers innovation and technoscientific advance, but it is due for a rethink, one consistent with its deeply holistic nature, requiring deeply human nurturing. Research is a deeply human endeavor that must be nurtured to achieve its full potential. As with tending a garden, care must be taken to organize, plant, feed, and weed—and the manner in which this nurturing is done must be consistent with the nature of what is being nurtured. In The Genesis of Technoscientific Revolutions, Venkatesh Narayanamurti and Jeffrey Tsao propose a new and holistic system, a rethinking of the nature and nurturing of research. They share lessons from their vast research experience in the physical sciences and engineering, as well as from perspectives drawn from the history and philosophy of science and technology, research policy and management, and the evolutionary biological, complexity, physical, and economic sciences. Narayanamurti and Tsao argue that research is a recursive, reciprocal process at many levels: between science and technology; between questions and answer finding; and between the consolidation and challenging of conventional wisdom. These fundamental aspects of the nature of research should be reflected in how it is nurtured. To that end, Narayanamurti and Tsao propose aligning organization, funding, and governance with research; embracing a culture of holistic technoscientific exploration; and instructing people with care and accountability.

Hand's End offers a new philosophy of technology as the fundamental way in which humans experience and define nature—the tool as humanity extended. Rothenberg examines human inventions from the water wheel to the nuclear bomb and discusses theories of technology in the thought of philosophers including Plato, Aristotle, Bacon, Marx, Heidegger, Spinoza, Mumford, and McLuhan.

Sport, Technology and the Body

The Nature of Tomorrow

Innovation Inspired by Nature

Significance

The Nature of Technology

What's the Future and Why It's Up to Us

Mediating Nature

Pioneering work on an important new approach to economics.

WTF? can be an expression of amazement or an expression of dismay. In today’s economy, we have far too much dismay along with our amazement, and technology bears some of the blame. In this combination of memoir, business strategy guide, and call to action, Tim O'Reilly, Silicon Valley’s leading intellectual and the founder of O’Reilly Media, explores the upside and the potential downsides of today's WTF? technologies. What is the future when an increasing number of jobs can be performed by intelligent machines instead of people, or done only by people in partnership with those machines? What happens to our consumer based societies—to workers and to the companies that depend on their purchasing power? Is income inequality and unemployment an inevitable consequence of technological advancement, or are there paths to a better future? What will happen to business when technology-enabled networks and marketplaces are better at deploying talent than traditional companies? How should companies organize themselves to take advantage of these new tools? What’s the future of education when on-demand learning outperforms traditional institutions? How can individuals continue to adapt and retrain? Will the fundamental social safety nets of the developed world survive the transition, and if not, what will replace them? O'Reilly is "the man who can really can make a whole industry happen," according to Eric Schmidt, Executive Chairman of Alphabet (Google.) His genius over the past four decades has been to identify and to help shape our response to emerging technologies with world shaking potential—the World Wide Web, Open Source Software, Web 2.0, Open Government data, the Maker Movement, Big Data, and now AI. O’Reilly shares the techniques he's used at O’Reilly Media to make sense of and predict past innovation waves and applies those same techniques to provide a framework for thinking about how today’s world-spanning platforms and networks, on-demand services, and artificial intelligence are changing the nature of business, education, government, financial markets, and the economy as a whole. He provides tools for understanding how all the parts of modern digital businesses work together to create marketplace advantage and customer value, and why ultimately, they cannot succeed unless their ecosystem succeeds along with them. The core of the book's call to action is an exhortation to businesses to DO MORE with technology rather than just using it to cut costs and enrich their shareholders. Robots are going to take our jobs, they say. O'Reilly replies, “Only if that’s what we ask them to do! Technology is the solution to human problems, and we won’t run out of work till we run out of problems." Entrepreneurs need to set their sights on how they can use big data, sensors, and AI to create amazing human experiences and the economy of the future, making us all richer in the same way the tools of the first industrial revolution did. Yes, technology can eliminate labor and make things cheaper, but at its best, we use it to do things that were previously unimaginable! What is our poverty of imagination? What are the entrepreneurial leaps that will allow us to use the technology of today to build a better future, not just a more efficient one? Whether technology brings the WTF? of wonder or the WTF? of dismay isn't inevitable. It's up to us!

This book is a resumption of the work “Integrated M/E Design: Building Systems Engineering” published by Anil Ahuja in 1997. Together with an international group of authors from the engineering, urban planning, and architecture fields, Mr. Ahuja discussed new trends and paradigms in the smart buildings and smart city sectors and extended the topic of the previous publication from the building to the entire city. A smart, sustainable building is not just about the building itself. There are things happening in the inside of the building and on the outside. A smart building connects the inside with the outside, provides efficiencies on both sides, synchronizes the outside infrastructure with its inside systems, and integrates nature and its occupants in its design. A smart building doesn’t just provide technology solutions. It is about constant exchange between the inside and the outside of the building, the contribution of the building to the quality of the entire neighborhood and the rest of the city, how the smart building can connect people in a sharing community, and how technology can be the key to make it happen.

“More than anything else technology creates our world. It creates our wealth, our economy, our very way of being,” says W. Brian Arthur. Yet despite technology’s irrefutable importance in our daily lives, until now its major questions have gone unanswered. Where do new technologies come from? What constitutes innovation, and how is it achieved? Does technology, like biological life, evolve? In this groundbreaking work, pioneering technology thinker and economist W. Brian Arthur answers these questions and more, setting forth a boldly original way of thinking about technology. The Nature of Technology is an elegant and powerful theory of technology’s origins and evolution.

Achieving for the development of technology what Thomas Kuhn’s The Structure of Scientific Revolutions did for scientific progress, Arthur explains how transformative new technologies arise and how innovation really works. Drawing on a wealth of examples, from historical inventions to the high-tech wonders of today, Arthur takes us on a mind-opening journey that will change the way we think about technology and how it structures our lives. The Nature of Technology is a classic for our times.

Unbound

Adaptation and the Future of Human Life

How We Got Here and What the Future Holds

The Nature of Performance

Increasing Returns and Path Dependence in the Economy

Biomimicry

How to Invest in the Adaptive Economy

"Highly informative and remarkably entertaining." —Elle From forest trails in Korea, to islands in Finland, to eucalyptus groves in California, Florence Williams investigates the science behind nature’s positive effects on the brain. Delving into brand-new research, she uncovers the powers of the natural world to improve health, promote reflection and innovation, and strengthen our relationships. As our moder indoors, these ideas—and the answers they yield—are more urgent than ever.

NATIONAL BESTSELLER • The Pulitzer Prize–winning author of The Sixth Extinction returns to humanity’s transformative impact on the environment, now asking: After doing so much damage, can we change nature, this time to save it? RECOMMENDED BY PRESIDENT OBAMA AND BILL GATES • SHORTLISTED FOR THE WAINWRIGHT PRIZE FOR WRITING • ONE OF THE TEN BEST BOOKS OF Washington Post • ONE OF THE BEST BOOKS OF THE YEAR: Time, Esquire, Smithsonian Magazine, Vulture, Publishers Weekly, Kirkus Reviews, Library Journal • “Beautifully and insistently, Kolbert shows us that it is time to think radically about the ways we manage the environment.”—Helen Macdonald, The New York Times That man should have dominion “over all the earth, and over every creeping earth” is a prophecy that has hardened into fact. So pervasive are human impacts on the planet that it’s said we live in a new geological epoch: the Anthropocene. In Under a White Sky, Elizabeth Kolbert takes a hard look at the new world we are creating. Along the way, she meets biologists who are trying to preserve the world’s rarest fish, which lives in a single tiny pool in the middle of the Mojave; engine emissions to stone in Iceland; Australian researchers who are trying to develop a “super coral” that can survive on a hotter globe; and physicists who are contemplating shooting tiny diamonds into the stratosphere to cool the earth. One way to look at human civilization, says Kolbert, is as a ten-thousand-year exercise in defying nature. In The Sixth Extinction, she explored the ways in which our capacity for the natural world. Now she examines how the very sorts of interventions that have imperiled our planet are increasingly seen as the only hope for its salvation. By turns inspiring, terrifying, and darkly comic, Under a White Sky is an utterly original examination of the challenges we face.

This provocative and timely book argues that contemporary ideas and practices concerning nature and technology remain closely bound up with religious ways of thinking and acting. Using examples from North America, Europe and elsewhere, it reinterprets a range of 'secular' phenomena in terms of their conditioning by a complex series of transformations of the sacred in Western history. The contempora politics, technological risk behaviour, alternative medicine, vegetarianism and ethical consumption take on new significance as sites of struggle between different sacral orderings. Nature, Technology and the Sacred introduces a radically new direction for today's critical discourse concerning nature and technology – one that reinstates it as a moment within the ongoing religious history of the West.

Between the 18th and 19th centuries, Britain experienced massive leaps in technological, scientific, and economical advancement

Intelligence and Technology

Technology and the Limits of Nature

Hand's End

Integration of Nature and Technology for Smart Cities

Men, Machines, and Modern Times

The Nature and Sources of Innovation in Africa

Environmental Science

This book presents an evolutionary theory of technological change based upon recent scholarship in the history of technology and upon relevant material drawn from economic history and anthropology. It challenges the popular notion that technology advances by the efforts of a few heroic individuals who produce a series of revolutionary inventions owing little or nothing to the technological past. Therefore, the book's argument is shaped by analogies taken selectively from the theory of organic evolution, and not from the theory and practice of political revolution. Three themes appear, and reappear with variations, throughout the study. The first is diversity: an acknowledgment of the vast numbers of different kinds of made things (artifacts) that have long been available to humanity; the second is necessity: the belief that humans are driven to invent new artifacts in order to meet basic biological requirements such as food, shelter, and defense; and the third is technological evolution: an organic analogy that explains both the emergence of novel artifacts and their subsequent selection by society for incorporation into its material life without invoking either biological necessity or technological progress. Although the book is not intended to provide a strict chronological account of the development of technology, historical examples - including many of the major achievements of Western technology: the waterwheel, the printing press, the steam engine, automobiles and trucks, and the transistor - are used extensively to support its theoretical framework. The Evolution of Techology will be of interest to all readers seeking to learn how and why technology changes, including both students and specialists in the history of technology and science.

Repackaged with a new afterword, this "valuable and entertaining" (New York Times Book Review) book explores how scientists are adapting nature's best ideas to solve tough 21st century problems. Biomimicry is rapidly transforming life on earth. Biomimics study nature's most successful ideas over the past 3.5 million years, and adapt them for human use. The results are revolutionizing how materials are invented and how we compute, heal ourselves, repair the environment, and feed the world. Janine Benyus takes readers into the lab and in the field with maverick thinkers as they: discover miracle drugs by watching what chimps eat when they're sick; learn how to create by watching spiders weave fibers; harness energy by examining how a leaf converts sunlight into fuel in trillionths of a second; and many more examples. Composed of stories of vision and invention, personalities and pipe dreams, Biomimicry is must reading for anyone interested in the shape of our future.

Signs are critically important in all forms of activity, including business, because they establish what it is to be human. Without signs we could not think, we could not communicate what we think and we could not ensure that we collaborate together in our work, home and leisure. The aim of this book is to explain how and why they are significant.

In "The Nature of Technology", ground-breaking economist W. Brian Arthur explores the extraordinary way in which the technology that surrounds us and allows us to live our modern lives has actually been developed. Rather than coming from a series of one-off inventions, almost all the technology we use today comes from previous developments: these technologies are not being created, but are instead evolving. With fascinating examples, from laser printers to powerplants, Arthur reveals how our own problem-solving skills and creative vision can evolve alongside these technologies, and how this understanding can even improve our understanding of the wider world

Nature, Technology and the Sacred

The Ethics of Invention: Technology and the Human Future

The Nature of the Future

Implications for Learning and Teaching

The Changing Nature of Work

Technology and the Character of Contemporary Life

The Nature of Technology and the Remaking of the Rhône

How does technology alter thinking and action without our awareness? How can instantaneous information access impede understanding and wisdom? How does technology alter conceptions of education, schooling, teaching and what learning entails? What are the implications of these and other technology issues for society? Meaningful technology education is far more than learning how to use technology. It entails an understanding of the nature of technology — what technology is, how and why technology is developed, how individuals and society direct, react to, and are sometimes unwittingly changed by technology. This book places these and other issues regarding the nature of technology in the context of learning, teaching and schooling. The nature of technology and its impact on education must become a significant object of inquiry among educators. Students must come to understand the nature of technology so that they can make informed decisions regarding how technology may influence thinking, values and action, and when and how technology should be used in their personal lives and in society. Prudent choices regarding technology cannot be made without understanding the issues that this book raises. This book is intended to raise such issues and stimulate thinking and action among teachers, teacher educators, and education researchers. The contributions to this book raise historical and philosophical issues regarding the nature of technology and their implications for education; challenge teacher educators and teachers to promote understanding of the nature of technology; and provide practical considerations for teaching the nature of technology.

Sara B. Pritchard traces the Rhône’s remaking since 1945, showing how state officials, technical elites, and citizens connected the environment and technology to political identities and state-building, and demonstrating the importance of environmental management and technological development to the culture and politics of modern France.

This book presents the current aspects of environmental issues in view of chemical processes particularly with respect to two facets: social sciences along with chemistry and natural sciences. The former facet explores the environmental economics and policies along with chemical engineering or green chemistry and the latter the various fields of environmental studies. The book was conceptualized in the form of e-learning content, such as PowerPoint presentation, with explanatory notes to a new style of lectures on environmental science in a university at undergraduate level. Each chapter of the book comprises a summary of the contents of the chapter; a list of specific terms and their explanation; topics that can be taken up for discussion among college students, mainly freshmen in liberal arts, and for enhancing general knowledge; and problems and solutions using active learning methods.

Work is constantly reshaped by technological progress. New ways of production are adopted, markets expand, and societies evolve. But some changes provoke more attention than others, in part due to the vast uncertainty involved in making predictions about the future. The 2019 World Development Report will study how the nature of work is changing as a result of advances in technology today. Technological progress disrupts existing systems. A new social contract is needed to smooth the transition and guard against rising inequality. Significant investments in human capital throughout a person’s lifecycle are vital to this effort. If workers are to stay competitive against machines they need to train or retool existing skills. A social protection system that includes a minimum basic level of protection for workers and citizens can complement new forms of employment. Improved private sector policies to encourage startup activity and competition can help countries compete in the digital age. Governments also need to ensure that firms pay their fair share of taxes, in part to fund this new social contract. The 2019 World Development Report presents an analysis of these issues based upon the available evidence.

Environment and Technology in History

The Genesis of Technoscientific Revolutions

The Impact of Tools on the Nature and Development of Human Abilities

Hostile Nature and Technological Failure in the Cold War

Confluence

The Unreliable Nation

The Story of Technology

Men, Machines, and Modern Times, though ultimately concerned with a positive alternative to an Orwellian 1984, offers an entertaining series of historical accounts taken from the nineteenth century to highlight a main theme: the nature of technological change, the fission brought about in society by such change, and society's reaction to that change. Beginning with a remarkable illustration of resistance to innovation in the U.S. Navy following an officer's discovery of a more accurate way to fire a gun at sea, Elting Morison goes on to narrate the strange history of the new model steamship, the Wapanoag, in the 1860s. He then continues with the difficulties confronting the introduction of the pasteurization process for milk; he traces the development of the Bessemer process; and finally, he considers the computer. While the discussions are liberally sprinkled with amusing examples and anecdotes, all are related to the more profound and current problem of how to organize and manage system of ideas, energies, and machinery so that it will conform to the human dimension.

We live in a world increasingly governed by technology—but to what end? Technology rules us as much as laws do. It shapes the legal, social, and ethical environments in which we act. Every time we cross a street, drive a car, or go to the doctor, we submit to the silent power of technology. Yet, much of the time, the influence of technology on our lives goes unchallenged by citizens and our elected representatives. In The Ethics of Invention, renowned scholar Sheila Jasanoff dissects the ways in which we delegate power to technological systems and asks how we might regain control. Our embrace of novel technological pathways, Jasanoff shows, leads to a complex interplay among technology, ethics, and human rights. Inventions like pesticides or GMOs can reduce hunger but can also cause unexpected harm to people and the environment. Often, as in the case of CFCs creating a hole in the ozone layer, it takes decades before we even realize that any damage has been done. Advances in biotechnology, from GMOs to gene editing, have given us tools to tinker with life itself, leading some to worry that human dignity and even human nature are under threat. But despite many reasons for caution, we continue to march heedlessly into ethically troubled waters. As Jasanoff ranges across these and other themes, she challenges the common assumption that technology is an apolitical and amoral force. Technology, she masterfully demonstrates, can warp the meaning of democracy and citizenship unless we carefully consider how to direct its power rather than let ourselves be shaped by it. The Ethics of Invention makes a bold argument for a future in which societies work together—in open, democratic dialogue—to debate not only the perils but even more the promises of technology.

Like Guns, Germs, and Steel, a work of breathtaking sweep and originality that reinterprets the human story. Although we usually think of technology as something unique to modern times, our ancestors began to create the first technologies millions of years ago in the form of prehistoric tools and weapons. Over time, eight key technologies gradually freed us from the limitations of our animal origins. The fabrication of weapons, the mastery of fire, and the technologies of clothing and shelter radically restructured the human body, enabling us to walk upright, shed our body hair, and migrate out of tropical Africa. Symbolic communication transformed human evolution from a slow biological process into a fast cultural process. The invention of agriculture revolutionized the relationship between humanity and the environment, and the technologies of interaction led to the birth of civilization. Precision machinery spawned the industrial revolution and the rise of nation-states; and in the next metamorphosis, digital technologies may well unite all of humanity for the benefit of future generations. Synthesizing the findings of primatology, paleontology, archeology, history, and anthropology, Richard Currier reinterprets and retells the modern narrative of human evolution that began with the discovery of Lucy and other Australopithecus fossils. But the same forces that allowed us to integrate technology into every aspect of our daily lives have also brought us to the brink of planetary catastrophe. Unbound explains both how we got here and how human society must be transformed again to achieve a sustainable future.

Technology: “The deliberate modification of any natural object or substance with forethought to achieve a specific end or to serve a specific purpose.”

What is the nature of athletic performance? This book offers an answer to this fascinating question by considering the relationship between sport, technology and the body. Specifically, it examines cultural resistance to the enhancement of athletes and explores the ways in which performance technologies complicate and confound our conception of the sporting body. The book addresses concerns about the technological "invasion" of the "natural" body to investigate expectations that athletic performances reflect nothing more than the actual capacity of the untainted athlete. By examining a series of case studies, including Paralympic sprinter Oscar Pistorius, Fastskin swimsuits, hypoxic chambers and an array of illicit substances and methods, the book distinguishes between internal and external technologies to highlight the ways that performance enhancement, and public reaction to it, can be read. Sport, Technology and the Body offers a powerful challenge to conventional views of athletic performance that stand authenticity against artifice, integrity against corruption, and athletic purity against technological intrusion. It is essential reading for all serious students of the sociology, culture or ethics of sport.

The Role of Technology in Ecological Literacy

What Technology Wants

World Development Report 2019

Under a White Sky

The Nature of Economics

A Philosophical Inquiry

The Nature of Value presents a theory of how economic value functions and how it drives growth, starting with tiny sparks of innovation and scaling all the way up to the full scope of the economy. Nick GogertyÕs exploration of value borrows from a wide array of disciplines, including anthropology, psychology, physics, sociology, and ethics, but most of all, it examines how evolutionÕs processes can help investors understand the economy and how investors can use this new understanding to improve their allocation decisions. Starting with a look at how innovations can help firms succeed, Gogerty looks at the economic niches in which firms compete and explores how firms can create defensive ÒmoatsÓ to enhance their chances of survival. He shows allocators how to adjust their actions for best

performance and returns and what to look for when assessing company management, supporting his arguments with extensive data and years of practitioner experience from scientific, social, and economic disciplines. Intuitive illustrations are used to illuminate central concepts and ideas. GogertyÕs practical takeaways, couched in vivid explanations, will help investors of all backgrounds gain fresh insight into market mechanics.

A collection of previous published papers by the author on the subject of complexity economics, appearing from the 1980s to the present.

Investigating the nature, drivers and sources of innovation in Africa, this book examines the channels for effective diffusion of innovation in and to Africa under institutional, resource and affordability constraints. Fu draws on almost a decade of research on innovation in Africa to explore these issues and unpack the process, combining a rigorous statistical analysis of a purposely designed multi-wave, multi-country survey with in-depth studies of representative cases. Building on this research, Fu argues that African firms are innovative but unsupported. Those 'under-the-radar' innovations that widely exist in Africa as a result of the constraints are not sufficient to enable Africa to leapfrog the innovation gap in the era of the fourth Industrial Revolution. This is the first comprehensive analysis of the creation and diffusion of innovation in low income countries. It also provides the first survey-based analysis of innovation in the informal economy.

This book explores the nature of technology - participatory media in particular - and its effects on our friendships and our fundamental sense of togetherness. Situating the notion of friendship in the modern era, the author examines the possibilities and challenges of technology on our friendships. Taking a media ecology approach to interpersonal communication, she looks at issues around phenomenology, recognition of friends as unique, hermeneutics in a digital world and mediated communication, social dimensions of time and space, and communication ethics. Examining friendship as a communicative phenomenon and exploring the ways in which it is created, sustained, managed, produced, and reproduced, this book will be relevant to scholars and students of interpersonal communication, mediated communication, communication theory and philosophy, and media ecology.